Kefford captured a male at light at Great Ballard School, New Milton, Hants. 25.vii.1935 (*Ibid.*, 1936. 1 (5). 121). These probably fall within the breeding area centred on Salisbury Plain.

The origin of the three following specimens is less easily explained. One was taken by Jager in S. Devon in 1899 (*Entomol.*, 1899. 32. 286): the second, recorded by Hawker-Smith (*Ent. Record*, 1928. 40. 39), according to G. Talbot, was a male taken in the light trap in the grounds of the Hill, Wormley Hill, near Witley, Surrey, and the third was taken at light at Eton College by E. C. Pelham-Clinton, 24.vii.1938 (*Entomol.*, 1938. 71. 237).

We are convinced that this species is not migratory and in fact may not wander far from its field-side localities. This is supported by the fact that only a solitary specimen was captured after days of collecting in ideal conditions at a spot only one mile away from a place where large numbers are known to occur. The species is indigenous and will probably be found in other districts where the type of soil and method of farming suit it. In such localities it has probably been overlooked because no one has used light in harvest fields. Even if light were used in such a situation *musculosa* might pass unnoticed among swarms of *Leucania pallens* and *impura* by anyone who was not expecting to see it.

In conclusion, we must thank Mr Haynes, whose earlier captures led us to look for the species where we did and who without hesitation showed us his old locality. We must express our gratitude to Mr Pitman and Mr Gater, who were the first to suspect the real habitat, and to Miss Gullick, who went with us to identify the various grasses, and to Mr Goddard for putting at our disposal his great knowledge of crops.

INSECT BIOTOPES IN SYRIA, IRAQ AND IRAN.

ECOLOGICAL FIRST IMPRESSIONS.

By E. P. Wiltshire, F.R.E.S.

The following notes endeavour briefly to summarise the ecological conditions governing insect-life in those Near East countries that I know. Anatolia, which I have not yet personally visited, cannot justly be omitted from such a summary, and my remarks on it, not being first-hand, are abbreviated. In the absence of an exhaustive zoogeographical analysis of all the biotopes, zoogeographical conclusions are also reduced to a minimum and expressed in general terms; any other course is impossible until the fauna of these lands is better known than it is to-day.

Taking geographical units such as Syria, Anatolia, Iraq, and Iran as heads of columns or vertical divisions, it is possible to trace four or five characteristic horizontal divisions which produce biotopes more or less corresponding to, and in some cases physically linked with, their counterparts in the other columns; these horizontal divisions are:—

1. High peaks.
2. Middle heights: either wooded hills or hilly steppe.
3. Deserts (and steppes).
4. Oases: rivers, irrigated cultivation and marshes.
5. Houses. (This class will not be discussed here.)

I shall now follow each of these divisions through the geographical units under discussion.

1. HIGH PEAKS.

The tops of mountains are ecologically isolated and contain a number of endemic species, or well-differentiated races. Probably during or just after the last Ice Age many of them were faunistically joined, but this is less probable of the Iranian mountains, for the climatic conditions of the Iranian plateau were hardly affected by the European Ice Ages; the differentiation of races of peak-species, therefore, is more complete in Iran. Nevertheless, the Iranian peak-fauna shows signs of a common, if remoter, origin. In many cases it is debatable whether local forms occurring on Iranian peaks should be regarded as distinct species or as subspecies.

A. *Syria.* Palestine should not really be separated from Syria except in considering the peculiar Jordan valley and Dead Sea fauna, but it contains no really high peaks. In Syria, there are the Lebanon, Anti-Lebanon and Hermon mountains, of which only the first[1] has been adequately explored.

B. In *Anatolia*, the Taurus[2] peaks are those that have been best explored.

C. In *Iraq* (and S.W. Iran), the Zagros peaks still require further exploration, though one of the (Iranian) Farsistan mountains has recently been fairly thoroughly explored, viz., Barm-i-Farus.[3]

D. *Iran* has recently received much attention from naturalists.[4] The Elburz range in N. Iran contains the greatest heights of any of my vertical divisions. During the Ice Age the Elburz snow-line was not more than 1000 m. lower than to-day, but the south side was even then arid.[5] There are many other high ranges in Iran, only some of which have been explored; but none of them contain the quantities of water at great heights which are found in the Elburz. The great richness of species of the Elburz marks it out as a primary centre of distribution for the whole Near East.

Most of the species peculiar to these great heights are restricted climatically. For instance, *Vanessa urticae* (a Euro-Siberian species) occurs in the Lebanon, Kurdistan, Anatolia, and North and Central Iran together with *Urtica dioica*, L., which I have only seen growing where ice-cold water flows; on the Syrian coast a different species of nettle grows which it will eat but on which it will not survive if bred at sea-level. Evidently both foodplant and host are restricted climatically, but I think it improbable that any characteristic peak-species is now restricted only by the availability of its foodplant. Failures to breed many polyphagous mountain-top larvae at other levels confirm this view.*

[1]Zerny; Ellison & Wiltshire.
[2]Osthelder & Pfeiffer.
[3]Brandt.
[4]Alberti; Brandt; Osthelder; Pfeiffer.
[5]Bobek.
*I think that the difference of air pressure is also concerned, perhaps especially in connection with eclosion from the pupa. In India I found this difficulty in rearing in the Plains insects brought down from the Hills.—T. B. F.

2. MIDDLE HEIGHTS.

These are either wooded or steppe-like, according to the degree of humidity. Deforestation also may reduce originally wooded hills to the status of hilly steppe.

Most of the Middle Heights of the extensive area under consideration have a typical population of steppe species, which I here term Anatolian-Iranian, which is the handiest English equivalent that I can find for Amsel's " Vorderasiatisch-Mediterran."

A. and B. In coastal Anatolia and the Lebanon a humid woodland, of a Mediterranean character, covers these Middle Heights, scrub-oaks, Aleppo pine and pistaccio being the characteristic indigenous trees, with juniper at the upper limit. Various degrees of deforestation and degradation occur, the extreme being in Palestine; but the resulting steppe-like terrain differs from the inland steppes, being favoured by mild winters and high humidity. On the east side of the Lebanon and in the Anti-Lebanon genuine hilly steppe occurs, with vestiges of juniper wood at a fair height. The Bekaa and Central Anatolia are also steppe-like.

C. The Zagros woods are linked up physically with the Anatolian; they differ from the Lebanon woods by their drier atmosphere and colder winters. They consist of several kinds of scrub-oak, pistaccio and paliurus, and are partly deforested.

D. *Iran*. The North Side of the Elburz is clad with a humid deciduous forest, of Euro-Siberian and Mediterranean character, but of tropical density, with junipers at the upper limit. High up on the arid south side of the range, the miserable relicts of a juniper woodland are to be found. The Middle Heights of the rest of Iran are steppe-like, except for the undeforested parts of the Zagros, and were probably not wooded even in the Pleistocene Age.

We find some species (e.g., *Simyra dentinosa*) apparently absent from the humid Lebanon woodland, but present at Upper Heights in the Lebanon and on steppe-like Middle Heights in Syria and Iraq; others (e.g., *Cucullia barthae*, Brsn.) occur at 8000 ft. in the Elburz, and down to 3000 ft. in Syria and Anatolia, including the humid woodlands in their range. The distribution of such species is of great interest, but further precise records from many parts of the Near East are needed before zoogeographical generalisations are possible.

The complete absence of woodland from the Interior of Iran does not result in the complete absence of species that seem typical of woodland in S. Europe and Asia Minor, because some of them depend on undergrowth vegetation, which exists in the oases (see below), while others in Iran become feeders on water-trees (e.g., *Lymantria dispar*, on oak in the Lebanon, on poplar in Iran).

Many species occurring at great heights occur also at Middle Heights, especially where the latter are arid and steppe-like and there is less difference in the vegetation of the two zones. Such species are less differentiated into local forms than those confined to the peaks. The vertical limits of a species' range are not necessarily identical in Syria, Iraq and Iran. Middle Height species tend to be euryoecous over large areas. Even in the arid parts there is a fairly strong " Mediterranean " penetration, growing weaker eastwards.

3. DESERTS AND STEPPES.

A regular winter rainfall distinguishes all the desert of the area under consideration from the " true " Sahara, in the sense of Zolotarevsky and Murat. (It resembles, therefore, that part of the Sahara closest to the Mediterranean, defined by Chevalier[6] as the " Northern Saharan Zone.") Most of the desert is stony, but in Central and Lower Iraq it consists of alluvial mud. In both kinds, but especially often in the alluvial, the soil has a salty tendency. Sand-dunes are not usual, except coastally. The alluvial desert is less rich in vegetation and animal life than the stony, except where marshes intrude on it.

The heavier precipitation of the Anatolian and Iranian high steppes cannot benefit vegetation because it coincides with the cold winter; it thus fails to relieve the desert-like nature of the Anatolian-Iranian plateau.

A. *Syria.* Here the desert proper begins eastward of the Anti-Lebanon. This range, however, and the Bekaa plain also, have a steppe-like character and harbour many desert-species. The dunes of the sea-shore, a continuous strip in Palestine from Sinai to Carmel, but only represented by outliers north of Mt. Carmel, carry the true desert-fauna northward up the western side of the Judaean and Lebanese hills. Here (and also on the shores of the Persian Gulf) the proximity of sea and desert, without intervening mountains to ward off the former's humidity, produces a particularly rich desert fauna. In such localities the two seasons of greatest insect-activity tend to converge, being divided by the coldest part of the year, i.e., a few weeks in January. The appearance on the wing of Lepidoptera in such localities, however, seems not to be so much regulated by this brief cold spell as by the incidence of autumnal rains.[7]

B. The steppes of Central Anatolia and Armenia must be considered together with those of Iran.

C. *Iraq.* In the North of Iraq, the desert is stony, i.e., a steppe desert, and inseparable from the Syrian desert. On some desert mountains in this desert the vestiges of pistaccio woodland survive (*P. mutica*). In Central and Southern Iraq, an alluvial desert, more or less relieved by irrigation or marsh, occupies the low valley of the Euphrates and Tigris, with a border, on either side, of low steppe desert. The low steppe desert, even in Northern Iraq, has milder winters than the Anatolian-Iranian steppe, but the coolness of its winters varies locally according to its elevation, which increases gradually towards the west and north. At higher elevations snow-falls occur every winter. A more detailed account of this desert is given in another paper.[8]

D. *Iran* contains deserts and steppes of all types. In the north and west-centre are high steppes subject to intense cold in winter and with the meagrest vegetation, which merge at their upper limits into high steppe-like mountains. In the centre and south are deserts warm enough to permit palm-cultivation in oases, but quite dry; the low, humid, torrid shores of the Persian Gulf and Indian Ocean are also desert.

[6]Vide Zolotarevsky & Murat.
[7]Wiltshire, 3.
[8]Wiltshire, 5.

Desert-species are euryoecous over vast areas. The Syrian-Mesopotamian desert is populated by Eremic species but has a strong penetration of Anatolian-Iranian species, a weaker " Mediterranean " penetration, and a still weaker penetration of Euro-Siberian species. Northward migrations of tropical species occur. Some of these migrants do not appear to breed in the desert, but rather in the oases; others probably cannot survive in any biotope, their appearance depending on fresh immigrants each year. The colder the winter, the larger will be this last class.

4. OASES: RIVERS, IRRIGATION AND MARSHLAND.

It is only possible in some cases to distinguish these three types of oasis-biotope from each other. Their common feature is the dependence of their vegetation on more water than is provided by local precipitation alone. In countries, therefore, where summers are rainless, there is a sharp contrast between them and the surrounding land. Their characteristic species are stenoecous, but they often contain thriving colonies of desert- and steppe-species, if the plants on which these feed like moist situations. When irrigation is interrupted or declines, the neglected land reverts to desert or steppe. Some of the stenoecous species migrate across the surrounding desert, but I have only noted this tendency in those of tropical origin. Wagner, however, has taken marsh-species at light in the Anatolian steppe at 10 km. from their breeding-ground. The various kinds of oasis will be dealt with in order of elevation: —

a. High rivers of the Elburz.
b. Mountain streams and rivers, and derived irrigation.
c. Persian gardens.
d. Hot desert rivers, and derived irrigation.
e. Marshes.

Zoogeographists class both oasis and desert insects as eremic, if their distribution so warrants. It is, however, noticeable that oasis-insects tend to be less pan-eremic than desert-insects; that is, they have become differentiated into many distinct species each with a more limited territory (cf. the tamarisk-feeding genus *Clytie*); this tendency is not surprising in stenoecous insects. It may be taken as a sign of the geological antiquity of the intervening desert tracts.

a. The high rivers of the Elburz (e.g., Lar). The meadows bordering these rivers contain many Euro-Siberian plants, but are treeless. These plants and their peculiar insect-hosts are stenoecous, the surrounding mountains being arid.

b. Mountain streams and rivers. These are generally characterised by walnut, poplar, willow, ash, tamarisk and oriental plane, in Syria, Iraq and Iran, and doubtless also in Anatolia; also in places, by *Phragmites* and *Typha*. Where the ground-contours permit, irrigation-channels lead the water off; the resulting strips of cultivation or " valley-oases " are more conspicuous in unwooded country, though even in wooded country closer investigation will reveal a certain number of stenoecous species dependent on water-trees and other hygrophilous vegetation. Nevertheless, the more humid a district, the less restricted many of these species will be. The humidity of the Lebanon woods and Caspian forests enables many species to be euryoecous there which are

stenoecous on the Iranian plateau and even in the Zagros. I have already quoted the case of *L. dispar* in this connection; another example is *Bapta distinctata*, euryoecous in the Lebanon woodlands, stenoecous in Iranian gardens. The trees and plants characteristic of the rivers are also, as a rule, to be found in the irrigated gardens of that district, except that tamarisks seem less frequent in the latter biotopes. Tilling of the ground, for vegetables or cereal-crops, usually only takes place on irrigable ground; spring barley is an exception to this rule. Often the extent of barley cultivation varies from year to year, according to the amount of spring rains. In such localities, therefore, a marginal zone of desert or steppe is to be found, on which cultivation has come and gone, to the detriment of the original steppe- or desert-flora and fauna. Rice is grown in certain Kurdish valleys, though less than on the Caspian littoral, and in lower Mesopotamia.

A and C. The above general remarks apply to *Syria* and *Iraq*.

D. *Iran*. In addition to the above-named trees, rivers and gardens in N. Iran permit the growth of *Celtis*, elm and wild olive.

The percentage of Euro-Siberian species in these stream-side and garden biotopes is higher than in the surrounding arid country, whether flat steppe or mountain-side. Whether these species are relicts of a fauna more euryoecous in a previous geological period or whether they are advance-colonists cannot here be discussed; it must, however, be stressed that trees and plants that will grow almost anywhere in Europe (e.g., sloe, hawthorn, elm, *Asperugo*) are strictly hygrophilous over the greater part of Iraq and Iran, and in places only grow where planted by man. Some Mediterranean species which penetrate are similarly restricted to oases, though a smaller proportion of them than of Euro-Siberian.

Where human culture has not interfered in oasis-biotopes, the fauna is often peculiar and of great interest on account of its endemic species, as in the case of the Tigris fauna (see below), but where cultivation has attacked these biotopes, they are less interesting, harbouring well-known cultivation-followers of the Euro-Siberian or Geopolitan categories. The intenser the cultivation, the less characteristic of the country does the biotope's fauna become. A similar lack of speciality is noticeable in artificial biotopes in Europe but with this difference: since cultivation in Europe implies clearing away and destroying the virgin flora, the fauna of the secondary biotope is an impoverished version of the original virgin fauna; whereas in Iraq and Iran, where cultivation implies irrigation and increases rather than diminishes general vegetable growth, artificial biotopes, even though some of the primary fauna may be exterminated, enrich the original euryoecous fauna by supporting quite foreign elements besides some of those species pertaining to natural uncultivated oases.

There are curious irregularities in the distribution of species attached to oasis-biotopes; for instance, the genus *Dicranura* seems absent from Syria and Palestine, though present in Anatolia, Iraq and Iran; and *Marumba populi* occurs in Iran but not in Iraq or Syria.

c. Persian gardens. Gardens in Iran may be watered directly by surface-channels, or by underground " canats "; the construction and operation of the latter is of great antiquity and characteristic of Per-

sian culture; they produce oasis-gardens or fields like green islands in a dusty plain, often miles from the mountains from which the water is derived. Such oases may either be of a flora like that described above under b, or, the climate permitting, as under d below. This method of irrigation is prevalent in Oman[9] and traces of it survive in Syria and Iraq, where, however, it is decadent (e.g., Palmyra and Kirkuk). Its presence outside Iran is doubtless a sign of previous Persian influence.[13]

d. Desert rivers. These are characterised by *Populus euphratica*, tamarisk, and, south of about latitude 34, palm-cultivation. This cultivation is as old as human culture in Iraq, land of the oldest human civilisation known to science. The rivers are:—The Jordan, the Euphrates and its tributary the Khabur (in N.E. Syria), the Tigris and its tributaries the two Zabs, the Dyala, the Kerkheh and the Karun. The isolated tropical species of the Jordan valley are thought to have gained access thither via the Gulf of Akaba, before the elevation of the floor of the Jordan-rift-valley in that vicinity and the subsequent separation of its flora and fauna from the Red Sea. This may be sufficient explanation for the similar flora of the Jordan and Euphrates valleys; or else this similarity may be explained by the Pleistocene Pluvial periods providing some link between these now separated but similar biotopes. The dried-up courses of one or two great Arabian rivers running eastward towards the Euphrates and the Persian Gulf may be evidences of such a link; or else the Bekaa plain (which we know was a lake in late Tertiary times) may have been then in some way connected faunistically with the upper reaches of the Euphrates.

These rivers are violent and irregular in behaviour. Every year spring floods half-submerge the river-trees at the very period of maximum insect-activity (April-May); minor alterations in the rivers' courses are frequent, and islands are constantly being formed and wiped out. Often the rivers break their banks and flood wide areas of desert; their lower courses are exceedingly marshy.

Palm-cultivation occurs at small oases as well as along these rivers, if the climate is suitable. In Iran palms grow at higher altitudes than in Iraq; Tabbas and Khur, the northernmost Iranian palm-oases, are 1858 m. high but within a degree of the latitude of the northern palm limit in Iraq; Mosul, which has no palms, is hardly 250 m. high. Palm-oases lack elm, plane, and ash, but often harbour many tamarisks as well as willow, poplar and nebek (*Zizyphus spina-christi*). An exclusively palm-garden will afford less protection to undergrowth (and therefore insects) than fruit-gardens, but usually in Iraq the two types of cultivation are mixed together. Where there is good protection from the heat of the sun and the aridity of the desert winds, a stenoecous fauna exists, the counterpart of that found in Persian gardens, but containing fewer Euro-Siberian species.[10]

The oases and irrigated fields of lower and Central Iraq are watered by lift-irrigation or dam-fed channels; the motor-pump has now replaced the water-wheel, and the principal dams are the Hindiya and the Kut barrages. Rice, wheat and cotton are here grown. In the golden

[9]Hogarth.

[13]Philby: Vol. II, pp. 28-29.

[10]Wiltshire, 4.

age of Mesopotamian civilisation big areas of continuous cultivation must have existed, but to-day the patches of cultivation are often separated, like islands, by a sea of invading desert. Years more of consistent progress are needed to restore Iraqian agriculture to what it used to be.

It is curious that some northward penetrating tropical species (e.g., *Taragama siva* and *Thermesia arefacta*), which feed in moist places on *Prosopis stephaniana* (*T. siva* also feeds on Euphrates poplar, tamarisk and pomegranate) do not seem to accompany that thorn into the unrelieved desert.

f. Marshes. Small swamps may occur in all the rivers and streams discussed above, but they are less characteristic than the marshes named below, because they are often so isolated and ephemeral. The larger marshes, in addition to the usual river fauna of the district they belong to, contain also a number of characteristic species. Amik and Ak-shehir are the only marshes of those mentioned below of which any record has been published.[11] Doubtless the vast Euphrates marshes contain some highly interesting secrets.

A. *Syria* (and Palestine). Oumk, on the Orontes; Amik, in the Bekaa; and Huleh, above Lake Tiberias.

B. *Anatolia*. Ak-shehir Lake.

C. *Iraq* (and S.W. Iran). The Euphrates, Tigris and Kerkheh marshes.

Internal reed-feeders appear earlier than in Europe, but produce no second brood (e.g., *P. typhae*, *A. sparganii* and *geminipuncta* in early July at Amik; *P. castaneae* in April in Khuzistan). *Phragmatobia fuliginosa*, however, a river and marsh insect in Syria, appears in two broods.

Having now followed our corresponding biotopes through the different Near East countries, and remarked the variations in each, some general remarks of a zoogeographical nature are possible.

Close though the correspondence may be between insect and plant distribution, phytogeography is not an infallible premise for zoogeography. Primarily climate governs the range of both plants and animals, which may react differently; the influence of vegetation on insects is secondary. The following illustrations will serve:—

1. A plant may range beyond the distribution of the insect attached to it. This is probably due to climatic or historical causes. Examples:

Chilena proxima is only known from the Mesopotamian desert, from Nisibin and Hassetche to Ahwaz, but apparently does not accompany its foodplant, *Prosopis stephaniana*, across the Zagros.

Taragama siva, *Thermesia arefacta* and *P. stephaniana*, see above.

Dicranura and poplar, see above.

Further examples are the numerous European species absent from England though their foodplant is present.

2. A plant's range may be far less wide than that of the insect attached to it in one country. This is largely because even non-polyphagous insects are usually addicted to a genus or family rather than a single species of plant. This adaptibility has doubtless been of great

[11]Ellison & Wiltshire; Wagner.

service to insects in the past and enabled them to survive environmental changes. The case of polyphagous species is so obvious an example of the above observation that I quote no examples, but the following are a few random examples of non-polyphagous insects: —

Hyloicus pinastri, only on Cedars of Lebanon. Two kinds of pine are available in the Lebanon, at lower altitudes than the cedars; in Europe, it is a typical pine-forest moth.

Lycaena alcon, F., feeding in one German biotope on *Gentiana cruciata*, in another on *Gentiana pneumonanthe*.[12]

The penetration of the Euro-Siberian element into these countries naturally interests European scientists. This penetration occurs in four ways: the species may occur (1) at great heights; euryoecously over isolated areas; *V. urticae*. (2) In deserts; absolutely (*P. gamma*) or partially (*P. machaon*) euryoecously. (3) In woods; euryoecously over the wooded area: *Thecla spini* (Lebanon), *Zephyrus quercus* (Kurdistan). (4) In oases; stenoecously: *Chr. phloeas*.

The third and fourth of these biotopes are the most favourable to Euro-Siberian species, and since even the relatively dry woods of Kurdistan are humid in comparison with the enormous expanse of steppe and desert and arid mountain, it can with reason be concluded that moisture plays as important a part as height, indeed a more important part, in permitting Euro-Siberian penetration. A combination of both factors will allow the most Euro-Siberian penetrants.

Some of these species penetrate on several of the biotopes, and one would expect those that penetrate the most unfavourable of the four biotopes (the desert) also to be able to live in two, if not three, of the others. And this is, as far as I know, the case, the third biotope (from which some are absent) being the mountain-tops. Absence from here can in some cases (e.g., tree species) be attributed to absence of foodplant but this explanation may not apply to all cases of absence. *P. machaon* is an example of a species penetrating all four biotopes, though less numerous in woodland and desert than in gardens, marshes, and on hill-sides. It is not absolutely euryoecous in the desert because its foodplant is absent from the flatter parts of the desert.

It is remarkable that the ecological valency of a so-called Euro-Siberian species should be as wide as that of *gamma* and *machaon*; one is tempted to question the correctness of their attribution to the Euro-Siberian category and to attribute them to a new category, the Holo-Palaearctic. I put forward the suggestion that where a species occurs and thrives in all the biotopes of a district of which it is not considered zoogeographically characteristic, the category to which it is attributed should at least be reconsidered.

In most other cases of equal adaptibility, one finds that the species in question are geopolitan in range, or at least widely distributed in the Palaeo-Tropical as well as the Palaearctic zones (e.g., *Nomophila noctuella* and *Euxoa ypsilon*).

To the question: Do insects belonging to one zoogeographical category react uniformly to ecological conditions? the answer is: Probably not.

For instance, Euro-Siberian species indeed seem usually to aestivate in deserts (or perhaps to emigrate thence in summer), but in adjoining

[12]Warnecke, 2.

oases may or may not aestivate (e.g., *P. rapae*, L., does not). Tropical species seem more often to have their repetition of broods interrupted by winter in deserts and oases than by summer, but *Agrotis ypsilon* is an exception. But until the life-cycle of each species has been observed throughout the year in all biotopes, a definite answer is not possible; when the full truth is known, I expect that no uniformity will be discovered.

[Biotopes = habitats; eremic = desert; euryoecus = widespread; stenooecus = localized.—G. W.]

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Correction.—The legend of the plate in the March number should be "Locality for *M. japygia* f. *cleanthe*, Montagne de Lure."